

Perceived Uncertainty in Self-Managed Service Teams: An Empirical Assessment

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Perceived uncertainty in self-managed service teams: an empirical assessment

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Keywords *Customer service, Service quality, Self-managing teams, Teamwork*

Abstract *This empirical study examines the impact of context-team factors and team-employee factors on perceived uncertainty in self-managed service teams. The results of our study show that context-team factors rather than team-employee factors are critical to the extent of uncertainty employees perceive when providing customer service. Furthermore, perceived uncertainty has negative impact on self-managed team outcomes in terms of job satisfaction and intention to leave the team. Besides this, our findings indicate that team commitment to customer service quality can serve as an effective tool to handle the negative consequences of perceived uncertainty in self-managed service teams. Finally, in addition to the cross-sectional analysis, a longitudinal exploration has been carried out, the outcomes of which suggest that the structural relationships are changing over time, underlining the need to take dynamic considerations into account in analyzing the effectiveness of self-managed work teams.*

Introduction

The formation of self-managed teams has become a commonplace phenomenon in many service organizations (e.g. Rathnam *et al.*, 1995; Uhl-Bien and Graen, 1998; Yeatts and Hyten, 1998). Self-managed teams are often viewed as effective tools to handle the flexibility and rapidly changing environmental needs and demands that service companies face nowadays.

Besides the advantages in terms of flexibility, increased employee initiative and customized customer care, contemporary work systems (such as self-managed teams) are increasingly characterized by instability and unpredictability (Wright and Cordery, 1999). The concept of uncertainty should, therefore, receive explicit attention as a contingency variable of within job design theory (Wright and Cordery, 1999). Due to the diversity of customer demand and the tendency of customers to participate in the performance of the service, many contemporary service processes are characterized by a high degree of uncertainty (Larsson and Bowen, 1989). Especially in (after-sales) service teams the work is particularly demanding and complex, as the work in teams requires flexibility and adaptability in response to the diversity of customer demand, leaving little room for predictive scheduling (Davis-Sacks, 1990; Hackman, 1990). This is further increased as individuals in service teams (as opposed to teams in a manufacturing context (cf. Barrick *et al.*, 1998) often have to cope with lack of physical proximity to their colleagues (Rathnam *et al.*, 1995).

Following organizational literature, it has been argued that by devolving decision making to employees (or teams of employees) the operating problems that characterize high uncertainty work environments may be responded to more rapidly or effectively and their impact on system performance minimized (Jackson and Wall, 1991). Devolving decision making to employees seems more effective, since a manager alone will be unable to process all the necessary information and make appropriate decisions. For example, Wright and Cordery (1999) have found that the implementation of the self-management approach in manufacturing firms that are characterized by a high uncertainty environment results in increased job satisfaction and intrinsic motivation.

Compared to production teams, however, surprisingly little is known about antecedents and potentially dysfunctional consequences of perceived uncertainty of employees working in self-managed teams in a service context (Rathnam *et al.*, 1995). More specifically, it has remained unclear how the characteristics of both the organizational context in which service teams operate and the intra-team characteristics affect service employee uncertainty perceptions and, in turn, attitudinal and behavioral correlates such as job satisfaction and employee turnover (Wright and Cropanzano, 1998). Yet, as many organizations are attempting to improve service levels, it has been pointed out that it is particularly relevant to offer an in-depth examination of factors that potentially determine self-management teams (in) effectiveness (Chaston, 1998; Hyatt and Ruddy, 1997).

Furthermore, the introduction of self-managed teams in services is a dynamic phenomenon that may change over time. Due to time, experience, or training, self-managed team processes and performance are characterized by temporal changes. Despite their relevance, the dynamics associated with temporal changes in work groups has received little attention so far (Morgan and Salas, 1993). As a consequence, the existing conceptual and empirical knowledge base on the implementation of self-managed service teams is relatively small.

In addition to examining the role of perceived uncertainty in after-sales service teams from a mainly cross-sectional perspective, we also take the dynamics of perceived uncertainty regarding this organizational change process into account. By performing an additional and primarily exploratory analysis of lagged effects (Johnson and Chang, 2000), we attempt to obtain more insight into the uncertainty phenomenon from the longitudinal perspective as well (cf. Banker *et al.*, 1996).

This paper is structured as follows. First, we develop a conceptual framework concerning antecedents and consequences of service employee perceived uncertainty associated with their functioning in self-managed teams. Next, the results of an empirical assessment of this framework will be presented. We conclude with a discussion of a number of theoretical and empirical implications of our findings.

Development of a conceptual framework

In this study perceived uncertainty has been conceptualized as the difference between the amount of information required to perform a certain task and the amount of information made available by the organization (cf. Galbraith, 1973). In more specific terms, Brass (1985) identifies three types of uncertainty of employees:

- (1) input uncertainty;
- (2) conversion uncertainty; and
- (3) output uncertainty.

In extending Brass's conceptualization of uncertainty to service employees operating in boundary-spanning teams, it seems imperative to take both environmental, organizational context and intra-team contingencies into account. As conversion uncertainty resembles task uncertainty, Larsson and Bowen (1989) argue the separation of input and conversion uncertainty is more appropriate in the case of a manufacturing context, rather than in service organizations due to customer input and information during the service encounter. Furthermore, Argote (1982) argues that because of the continuous contact between service units and the external and internal environment the distinction between input and conversion becomes artificial. Therefore, we only distinguish between input and output uncertainty in this paper.

Following Larsson and Bowen (1989, p. 217), we define input uncertainty as "the service employee's incomplete information about what, where, when and how customer input is going to be processed to produce the desired outcomes". In the new reality of self-management, employees may lack guidelines and run into bureaucratic hindrances diametrically opposed to self-management.

Furthermore, service employees have limited control over many of the issues they have to deal with as they originate from customer demand. As a result, the input to their role, both in terms of content and volume, remains uncertain. For example, it remains difficult to predict how many service requests will be made within a particular timeframe.

Moreover, it is not always clear what is meant by the "desired outcome". Particularly, service employees in self-management teams are confronted with this output uncertainty, which is defined as "incomplete information regarding performance criteria". The incompatibility between multiple performance criteria developed at firm, team and customer level is a result of the conflicting demands from the organization, co-workers and customers in terms of operational efficiency or standardization (e.g. x number of customers served) versus effectiveness or customization (e.g. high customer satisfaction ratings). Furthermore, inherent confusion between self- and team interests or personal and collective benefits increase output uncertainty in a self-managed team context.

In the next section we will explore antecedents and consequences of both types of perceived uncertainty.

Antecedents of perceived uncertainty

Antecedents of perceived uncertainty associated with self-managed teams can be split into two categories. The first category contains variables that describe the internal organizational environment in which self-managed teams operate (Guzzo and Dickson, 1996). This category is called the context-team interface. Meta-analytic studies of team effectiveness have identified organizational context as an important determinant (Campion *et al.*, 1993, 1996). Hyatt and Ruddy (1997, p. 577) also note that “too often researchers of group effectiveness only focus on the group itself and neglect the environment in which the group operates”. The second category contains variables that describe the intra-group processes that take place among the individual employees of a team; this category is called the team-employee interface.

Context-team antecedents

Formalization. In various contexts various authors (Rathnam *et al.*, 1995; Hackman, 1987; Hyatt and Ruddy, 1997) show that clear rules regarding work procedures and performance criteria may help to clarify role expectations of employees and consequently reduce output uncertainty especially in the context of boundary spanning self-management. Hence:

H1: There will be a negative relationship between formalization and output uncertainty of self-managed service team members.

Bureaucratic obstacles. Uhl-Bien and Graen (1998) argue that centralized administrative structures and systems can seriously impede the effectiveness of self-management. Such bureaucratic obstacles, e.g. centralized decision-making authority, inflexible rules and regulations, etc., are at odds with the very nature of self-management. By sending out mixed messages to employees they may contribute to an increase in perceived uncertainty (Campion *et al.*, 1993). Hence:

H2a: There will be a positive relationship between bureaucratic obstacles and input uncertainty of self-managed service team members.

H2b: There will be a positive relationship between bureaucratic obstacles and output uncertainty of self-managed service team members.

Empowerment. Campion *et al.* (1993) define empowerment as the ability to make business decisions and the acceptance of the responsibility for the outcomes of the decisions (cf. Bowen and Lawler, 1992; Hartline and Ferrell, 1996). For management empowerment implies relinquishing control over many aspects of the service delivery process. It may be expected that empowerment decreases perceived uncertainty among employees. Terra (1995) states that delegating decision-making responsibility regarding team tasks has an effect on the employee's sense of control. Hence:

H3a: There will be a negative relationship between empowerment and input uncertainty of self-managed service team members.

H3b: There will be a negative relationship between empowerment and output uncertainty of self-managed service team members.

Team-employee antecedents

Besides organizational context factors, intra-group factors are a prerequisite of a supportive work environment. Members of organizational subgroups, like self-managed teams, establish their own set of norms and values leading to attitudinal and behavioral conformity. Social influence and normative control effectively lead to uncertainty reduction (George and Bettenhausen, 1990). The work group research literature proposes social cohesion, communication and commitment to task performance as potentially important factors (Barrick *et al.*, 1998).

Social cohesion. Social cohesion refers to the synergistic interaction between team members and it is suggested to reduce uncertainty in team's functioning (Barrick *et al.*, 1998; Klein and Mulvey, 1990). For example, personal support of colleagues helps to decrease occupational uncertainty (Kahn and Quinn, 1970). Also, members of cohesive teams are more supportive of individual employees than non-cohesive teams. Finally, conformity to group standards tends to be higher in cohesive groups and consequently more role clarity and less output uncertainty occur (George and Bettenhausen, 1990). Hence:

H4a: There will be a negative relationship between social cohesion and input uncertainty of self-managed service team members.

H4b: There will be a negative relationship between social cohesion and output uncertainty of self-managed service team members.

Functional communication. It has been demonstrated that within self-managed teams, functional communication-sharing task-related information – is an important predictor of group effectiveness. The team members' high level of interdependence requires frequent interaction to exchange functional information (Campion *et al.*, 1993; Goodman *et al.*, 1986). In after-sales service teams, groups are responsible for servicing a wide range of customer requests, varying from routine maintenance to unique service needs. So, team members need to communicate about simple facts like prioritization of service, expected duration of visit, etc., as well as complicated questions like ways of dealing with not previously encountered technical and service issues in order to deal with input uncertainty (Davis-Sacks, 1990; Hyatt and Ruddy, 1997). Therefore, we hypothesize:

H5: There will be a negative relationship between functional communication and input uncertainty of self-managed service team members.

Team commitment to service quality. Peccei and Rosenthal (1997) have demonstrated that team commitment to customer service is a conduit to the provision of high-quality service by self-managed teams. Following Peccei and Rosenthal (1997) team commitment to service quality can be defined as “the

relative propensity of a team to engage in continuous improvement and exert effort for the job on the benefit of customers". Other authors have defined commitment-related constructs in attitudinal terms (e.g. Heskett, 1987), yet the behavioral focus of our definition provides a way to operationalize commitment to customer service in terms of job performance aspects. Such aspects, e.g. service improvement initiatives, promoting service quality standards and exhibiting extra-role behaviors aimed at customer satisfaction, are critical in the services marketing context. According to Peccei and Rosenthal (1997), on the basis of their empirical study, employee commitment to service quality is defining performance, hence potentially reducing output uncertainty. An active involvement with service quality may lead to a clear knowledge and understanding of what high-quality customer service performance entails and of how it can best be provided (George and Bettenhausen, 1990). According to goal-setting and expectancy arguments (e.g. Latham and Locke, 1991), this knowledge will decrease employees' experience of output uncertainty (Peccei and Rosenthal, 1997). Therefore, we hypothesize that:

H6: There will be a negative relationship between team commitment to service quality and output uncertainty of self-managed service team members.

Based on the systems paradigm we expect input uncertainty to have implications for output uncertainty. As the information concerning organizational demands and about how to deal with customer inputs is incomplete, service employees experience growing uncertainty with respect to the performance criteria (Larsson and Bowen, 1989). Therefore, we hypothesize that:

H7: There will be a positive relationship between input and output uncertainty of self-managed service team members.

Consequences of perceived uncertainty

In addition to the antecedents, job satisfaction and intention to leave the team will be discussed as outcomes of perceived uncertainty. Below we will provide a theoretical justification for studying these relationships.

Job satisfaction

Wexley and Yukl (1984) define job satisfaction as "the way an employee feels about his or her job". Job satisfaction indeed covers a broad conceptual domain as it includes "all characteristics of the job itself and the work environment which salesmen find rewarding, fulfilling, and satisfying, or frustrating and unsatisfying" (Churchill *et al.*, 1974). Operationally, job satisfaction consists of several facets, including satisfaction with the supervisor, work, pay, advancement opportunities, co-workers, and customers (Brown and Peterson, 1993). It has already been demonstrated that service employees who lack the required information to enact their task appropriately show reduced job satisfaction (Boles and Babin, 1996; Michaels *et al.*, 1987). Furthermore, it has

been investigated that a high incompatibility between various job performance criteria also leads to decreased job satisfaction (Hartline and Ferrell, 1996). Both information deficiency and discrepancy between job performance criteria are characteristics of high-perceived uncertainty, so we hypothesize that:

H8a: There will be a negative relationship between input uncertainty and job satisfaction of self-managed service team members.

H8b: There will be a negative relationship between output uncertainty and job satisfaction of self-managed service team members.

Intention to leave the team

A direct relationship between perceived uncertainty and turnover intention (Netemeyer *et al.*, 1990) is not expected, but it is important to incorporate this construct in our model. Because of the associated costs, organizations and researchers seek to understand the reasons for employee turnover. Turnover intention is considered the immediate predecessor to actual turnover (Russ and McNeilly, 1995). Especially in a team context it seems of considerable relevance. Self-managed teams are characterized by synergistic interdependency (Hyatt and Ruddy, 1997) and voluntary employee turnover may seriously threaten the balance needed to perform effectively. Thus, following Hackman (1987), work team assessment must capture both current attitudes and future behavioral intentions (i.e. the intention to continue working within the team). Several researchers have suggested an inverse relationship between job satisfaction and turnover intention (e.g. Singh, 1993; Singh and Rhoads, 1994). Therefore, we hypothesize that:

H9: There will be a negative relationship between job satisfaction and intention to leave the self-managed team.

In the next section we will report on the results of a study aimed at empirically testing this model.

An empirical study

Research setting

An empirical study was conducted among after-sales service employees organized in self-managed teams working for a major office equipment company in The Netherlands. The firm employs approximately 17,500 people worldwide and has principal companies in 30 countries. It has achieved an annual turnover of approximately \$2.5 billion. Its customer base is primarily located in Western Europe (more than 50 per cent of turnover) and the USA (about 25 per cent of turnover). Lately, the firm has also started some activities in Eastern Europe and Asia. The company seeks to occupy a leading position on its markets worldwide by offering advanced products and services characterized by their high technological quality, durability, reliability, productivity, customer-friendliness and environmental friendliness (7 per cent of annual turnover is invested in R and D). The company emphasizes the

medium- and high-volume segments and has maintained relatively long relationships with its customers. About 30 per cent of the employees are active in services (i.e. more than 5,000 people).

Most of the firm revenues come from service. The service department of the company in The Netherlands employs about 250 employees organized in nine geographical business units with their own manager and customer base. Since December 1996, self-managed teams were introduced in the service department in order to provide customer service in terms of quality, flexibility and effectiveness. In each unit, service engineers were grouped into three after-sales service self-managed teams of about eight people. Operational planning, developing objectives and monitoring performance were the key responsibilities of the teams. The implementation of these self-managed teams in the service department is an organizational change process. As a consequence, the nature of the self-managed teams and their position within the service department may change considerably over time. Furthermore, it has been recognized that the transition to self-managed teams takes time. Due to uncertainty, vested interests and misunderstandings, employees may resist this organizational change. Therefore, the practical rationale for conducting our study was to examine the impact of team processes and organizational variables on the uncertainty employees experience in doing their redefined jobs and to investigate its consequences.

Questionnaire development

Since perceived uncertainty is experienced, first and foremost, individually, we took the individual employee as unit of analysis. Another reason is that while the after-sales service employees in our study work in self-managed teams, the majority of their work-time is spent in isolation from their co-workers as they operate at the site of the customer.

All constructs included in the conceptual model were scale-items assessed with seven-point Likert-type scales where higher scores indicate higher agreement with each statement. The Appendix (Table AI) contains sample items for each of the constructs used. Formalization (two items) was measured using items adapted from a scale developed by Ferrell and Skinner (1988). Bureaucratic obstacles (three items) was developed specifically for this study. The operationalization of empowerment (nine items) was based upon the instrument of Hartline and Ferrell (1996). Social cohesion (five items) was assessed using a scale designed by Stokes (1983). The operationalization of functional communication (nine items) was partly based on a communication-instrument described by Campion *et al.* (1996), whereas other items were developed specifically for this study. The team commitment to service quality-construct (nine items) was developed specifically for this study on the basis of interviews with service engineers. Input uncertainty (six items) was operationalized on the basis of Rathnam *et al.* (1995), while the operationalization of output uncertainty (six items) was developed specifically for this study. Job satisfaction (8 items) is an adaptation of a scale originally

devised by Churchill *et al.* (1974). Intention to leave the team (two items) was based on Kumar *et al.* (1995).

The questionnaire was pre-tested in two stages. First, marketing research students were asked to fill in the questionnaire and to detect biases. Second, employees of the office equipment manufacturer were asked to do the same. After each stage the questionnaire was modified and refined.

Sampling and surveying

Due to the limited number of employees and teams we decided to conduct a census, i.e. all employees were approached to participate in our study. Sampling was done in 1997 and repeated in approximately 12 months later in 1998. This panel design enabled us to study dynamic effects (e.g. Johnson and Chang, 2000).

A mail questionnaire was designed containing closed questions as well as open-ended questions. The questionnaires were returned to the researcher by mail. The population included 226 employees in 1997 and 230 in 1998, organized in 27 self-managed work teams. In the first wave, 200 questionnaires were returned and in the second wave 206 questionnaires. Removing questionnaires with one or more missing values led to 164 usable questionnaires in the first wave and 177 usable questionnaires in the second wave. So response rate was above 50 per cent (88.5 per cent, and 89.6 per cent respectively). Partly as a result of employee turnover, in total 140 employees completed the questionnaire adequately for both waves.

Data analysis

Sample characteristics

A number of demographic variables have been included in the questionnaire to describe the sample characteristics for the two waves (see Table I). Regarding age, the sample can be split in two almost equal parts at the age 40 (wave 1: 57.5 per cent vs. 42.5 per cent; wave 2: 61.7 per cent vs. 38.3 per cent). With respect to education, both waves show a large majority of employees only having secondary-school education (wave 1: 84.2 per cent; wave 2: 87.6 per cent). Furthermore, we see that the large majority of the service employees have extensive company experience, whereas most people only have little team experience. The percentage of highly experienced people remains almost unchanged over time.

Construct analyses

Before testing the hypothesized relationships in the structural model, the scales used to operationalize the constructs were examined by estimation of the measurement model (cf. Anderson and Gerbing, 1988; Osterhus, 1997).

Unidimensionality. Unidimensionality can be defined as the existence of one construct underlying a set of items and has been recognized as “one of the most critical and basic assumptions of measurement theory” (Hattie, 1985, p. 139). The overall fit of the model provides the necessary and sufficient information to determine whether a set of items is unidimensional (Kumar and Dillon, 1987).

				Perceived uncertainty in service teams
Demographics	Category	Frequency	Percentage	
<i>Wave I</i>				
Age	< 31 years	53	33.1	167
	31-40 years	39	24.4	
	41-50 years	50	31.3	
	> 50 years	18	11.2	
Education	Secondary school	123	84.2	
	Secondary school +	23	15.8	
Company experience	< 1 year	7	4.4	
	1-4 years	29	18.2	
	5-8 years	28	17.6	
	9-12 years	19	11.9	
	13-16 years	8	5.0	
	> 16 years	68	42.8	
Team experience	< 1 year	55	34.6	
	1-2 years	44	27.7	
	2-3 years	23	14.5	
	3-4 years	5	3.1	
	4-5 years	3	1.9	
	> 5 years	29	18.2	
<i>Wave II</i>				
Age	< 31 years	71	40.6	
	31-40 years	37	21.1	
	41-50 years	49	28.0	
	> 50 years	18	10.3	
Education	Secondary school	155	87.6	
	Secondary school +	22	12.4	
Company experience	< 1 year	15	8.5	
	1-4 years	48	27.3	
	5-8 years	17	9.7	
	9-12 years	18	10.2	
	13-16 years	7	4.0	
	> 16 years	71	40.3	
Team experience	< 1 year	25	14.3	
	1-2 years	49	28.0	
	2-3 years	44	25.1	
	3-4 years	22	12.6	
	4-5 years	7	4.0	
	> 5 years	28	16.0	

Table I.
Sample characteristics

A single-factor representation was used for each set of congeneric items. To assess the fit of the constructs we use the following criteria: GFI, AGFI, RMSR, TLI, CFI and RMSEA.

The scales for social cohesion, input uncertainty, output uncertainty and job satisfaction initially showed an unacceptable fit. After an iterative process in which we inspected *t*-values, the pattern of standardized residuals and the modification indices, one item was deleted for input uncertainty, output uncertainty, job satisfaction and social cohesion (cf. Wetzels, 1998; Steenkamp and Van Trijp, 1991). Table II shows test criteria after this adjustment.

Construct ^b	GFI	AGFI	RMSR	NNFI	CFI	RMSEA
FORM	— ^a	— ^a	— ^a	— ^a	— ^a	— ^a
BUREAU	— ^a	— ^a	— ^a	— ^a	— ^a	— ^a
EMPOW	0.94	0.89	0.04	0.95	0.97	0.09
COH	0.98	0.95	0.03	0.99	0.99	0.04
COM	0.89	0.81	0.05	0.88	0.91	0.13
TCSQ	0.91	0.82	0.05	0.89	0.93	0.13
INP	0.98	0.93	0.03	0.99	0.99	0.04
OUT	0.97	0.87	0.03	0.95	0.98	0.14
JS	0.93	0.87	0.06	0.89	0.93	0.11
LEAVE	— ^a	— ^a	— ^a	— ^a	— ^a	— ^a

Notes: ^a Trivial fit for two-item and three-item scales

^b FORM = Formalisation; BUREAU = Bureaucratic obstacles; EMPOW = Empowerment; COH = Social cohesion; COM = Functional communication; TCSQ = Team commitment to service quality; INP = Input uncertainty; OUT = Output uncertainty; JS = Job satisfaction; LEAVE = Intention to leave

Table II.
Undimensionality

Reliability. Composite reliability assesses the internal consistency of a measure, and is measured by coefficient α (Netemeyer *et al.*, 1990). All constructs showed a coefficient α , larger than 0.80, except for formalization. Coefficient α for this construct was 0.66, which we considered acceptable.

Convergent validity. Within-method convergent validity was assessed testing the significance and the magnitude of each indicator's coefficient (cf. Anderson and Gerbing, 1988). We found that 93 per cent (50 out of 54) of all items loaded higher than 0.5 on their respective constructs with a minimum *t*-value of 2.71.

Discriminant validity. Discriminant validity was evaluated by testing whether pairs of constructs were correlated less than unity. We used Chi-square difference tests with one degree of freedom to test for unity. All tests were significant at the 5 per cent significance level. Inspection of the correlation matrix and the accompanying standard errors reveals that none of the correlations are within two standard errors of 1.0, which is indicative for the existence of discriminant validity. Applying Fornell and Larcker's (1981) test of average trait variance extracted, all of the pairs, with exception of the pair job satisfaction-team commitment to service quality, demonstrate that the average variance extracted from the traits exceeds the squared correlation estimate between the two constructs.

Model testing

In order to test the hypotheses we used the partial aggregation model (Bagozzi and Heatherton, 1994). A correlation matrix on the basis of listwise deletion of missing values was calculated using PRELIS2 and was used as an input to LISREL8. Maximum likelihood was used to estimate the free parameters in our conceptual model. Table III contains an overview of the correlation coefficients and of some other descriptive statistics. Most correlations are significant.

Variables	Mean (sd)	1	2	3	4	5	6	7	8	9	10
1. Formalization	4.04 (1.24)	1.00									
2. Bureaucratic obstacles	2.47 (1.20)	0.17	1.00								
3. Empowerment	5.59 (0.80)	-0.09	-0.36 ^{***}	1.00							
4. Social cohesion	5.28 (1.05)	-0.16	-0.18 ^{**}	0.42 ^{**}	1.00						
5. Funct. communication	5.14 (0.83)	-0.06	-0.30 ^{**}	0.62 ^{***}	0.72 ^{***}	1.00					
6. TCSQ	5.21 (0.82)	0.04	-0.01	0.39 ^{***}	0.27 ^{***}	0.30 ^{***}	1.00				
7. Input uncertainty	3.00 (1.10)	0.12	0.23 ^{**}	-0.54 ^{***}	-0.25 ^{***}	-0.45 ^{***}	-0.21	1.00			
8. Output uncertainty	2.55 (0.94)	-0.15	0.23 ^{**}	-0.45 ^{***}	-0.20 ^{***}	-0.40 ^{***}	-0.15	0.46 ^{***}	1.00		
9. Job satisfaction	4.77 (0.78)	0.10	-0.20	0.58 ^{***}	0.39 ^{***}	0.57 ^{***}	0.64 ^{***}	-0.41 ^{***}	-0.49 ^{***}	1.00	
10. Intention to leave	1.85 (1.06)	-0.03	0.09	-0.34 ^{**}	-0.18	-0.30 ^{**}	-0.58 ^{**}	0.36 ^{**}	0.31 ^{**}	-0.55 [*]	1.00

Notes: ^{*} $p < 0.05$; ^{**} $p < 0.01$; $n = 164$

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Table III.
Descriptive statistics
and correlations

Before estimating the hypothesized conceptual model, we computed the variance inflation factor (VIF) for each variable in order to assess multicollinearity. In this test, each variable becomes a dependent variable and is regressed on the remaining independent variables. Generally, a VIF value that exceeds ten is an indication of severe multicollinearity (Hair *et al.*, 1995; Neter *et al.*, 1990). In our analyses all VIF values remained well below this cut-off value.

A test of the relationships pre-specified in our conceptual model yields an unacceptable fit: $\chi^2(14) = 135.68$ [$p = 0.00$]; GFI = 0.89; AGFI = 0.56; CFI = 0.80; RMSR = 0.11; TLI = 0.36; RMSEA = 0.23. We found that six of the paths hypothesized in our model were not significantly different from zero. More specifically, there was no significant impact of bureaucratic obstacles on both input uncertainty and output uncertainty. Furthermore, no significant effect of social cohesion on the two uncertainty constructs was found. Functional communication exerted no significant influence on input uncertainty, whereas formalization and team commitment to service quality did not significantly affect output uncertainty. Deleting these paths did not significantly affect the model fit but the model became more parsimonious. Furthermore, inspection of the modification indices suggested two additional relationships in our model (Jöreskog and Sörbom, 1989, 1993). We found that team commitment to service quality directly influences both job satisfaction and intention to leave.

Re-estimating the model with these additional relationships yielded a good fit to the data $\chi^2(20) = 39.73$ [$p = 0.0054$]; GFI = 0.95; AGFI = 0.88; CFI = 0.97; RMSR = 0.038; TLI = 0.93; RMSEA = 0.078. The notion that the final (modified) model outperforms the initial model is further supported by comparison of several other fit indices for both models. More specifically, we used the following fit indices to compare the fit of the two models: Non-Centrality Parameter (NCP), Scaled Non-Centrality Parameter (SNCP), Parsimony Goodness of Fit Index (PGFI), Parsimony Normed Fit Index (PNFI) and Akaike Information Criterion (AIC). For our initial model the values for the various statistics are: NCP = 121.68; SNCP = 0.74; PNFI = 0.42; PGFI = 0.35; AIC = 217.68. Whereas for our modified model these statistics are: NCP = 19.73; SNCP = 0.12; PNFI = 0.42; PGFI = 0.35; AIC = 109.73. The modified model scores better on the indices than our originally developed framework. Therefore, we will use the modified model as basis for our hypotheses testing.

Hypothesis testing

Inspection of the path coefficients allows us to test the relationships in our conceptual framework (see Table IV). Starting with the context-team antecedents to perceived uncertainty we can observe that formalization influences output uncertainty significantly (standardized path coefficient = -0.28; t -value = -3.30). Therefore, we fail to reject *H1*. Bureaucratic obstacles do not exhibit a significant relationship with input uncertainty or output uncertainty. Consequently, we reject *H2a* and *H2b*. With regard to the *H3a* and *H3b*, it becomes clear that empowerment has a significant impact on both input

Relationships ^a	Hypothesis	Stand. path coefficient	Hypothesis testing
FORM → OUT	<i>H1</i>	−0.28 (−3.30)	Failed to reject
BUREAU → INP	<i>H2a</i>	n.s.	Rejected
BUREAU → OUT	<i>H2b</i>	n.s.	Rejected
EMPOW → INP	<i>H3a</i>	−0.51 (−4.74)	Failed to reject
EMPOW → OUT	<i>H3b</i>	−0.33 (−3.31)	Failed to reject
COH → INP	<i>H4a</i>	n.s.	Rejected
COH → OUT	<i>H4b</i>	n.s.	Rejected
COM → INP	<i>H5</i>	n.s.	Rejected
TCSQ → OUT	<i>H6</i>	n.s.	Rejected
INP → OUT	<i>H7</i>	0.35 (3.42)	Failed to reject
INP → JS	<i>H8a</i>	−0.21 (−4.21)	Failed to reject
OUT → JS	<i>H8b</i>	−0.31 (−2.89)	Failed to reject
JS → LEAVE	<i>H9</i>	−0.45 (−3.33)	Failed to reject
TCSQ → JS	B	0.65 (9.94)	
TCSQ → LEAVE	B	−0.28 (−2.08)	

Notes: ^a FORM = Formalization; OUT = Output uncertainty; BUREAU = Bureaucratic obstacles; INP = Input uncertainty; EMPOW = Empowerment; COH = Social cohesion; COM = Functional communication; TCSQ = Team commitment to service quality; JS = Job satisfaction; LEAVE = Intention to leave
^b Corresponding *t*-values between parentheses

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Table IV.
Estimated path
coefficients

uncertainty (standardized path coefficient = −0.51; *t*-value = −4.74) and output uncertainty (standardized path coefficient = −0.33; *t*-value = −3.31), consequently we fail to reject the *H3a* and *H3b*.

Turning to the employee-team interface, we see that social cohesion does not have a significant impact on either of the uncertainty constructs. Thus, we have to reject *H4a* and *H4b*. It should be noted that, although the relationships between social cohesion and the uncertainty constructs are insignificant, their coefficients are opposite to the hypothesized direction. As functional communication does not significantly affect input uncertainty, we have to reject *H5*. Team commitment to service quality does not exhibit a significant relationship with output uncertainty, and therefore we reject *H6*. However, based on the modification indices, we can conclude that team commitment to service quality shows a strong positive influence on job satisfaction (standardized path coefficient = 0.65; *t*-value = 9.94) and a significant negative relationship with intention to leave (standardized path coefficient = −0.58; *t*-value = −2.08).

The outcomes of the uncertainty constructs are completely as expected. First of all, it should be noted that input uncertainty significantly increases output uncertainty (standardized path coefficients = 0.35; *t*-value = 3.42). As a consequence, we fail to reject *H7*. Both input uncertainty and output uncertainty are significantly related to job satisfaction. As a consequence, we fail to reject *H8a* (standardized path coefficient = −0.31; *t*-value = −4.21) and *H8b* (standardized path coefficient = −0.21; *t*-value = −2.89). Finally, job

Additional exploratory analysis

The introduction of self-managed work teams in an organization is a dynamic rather than a static process. The organization, and the employees in particular, has to adjust to the new structure, getting accustomed to new roles and responsibilities. As a result of time, experience, and training, the temporal aspects of team processes and performance require research attention (Morgan and Salas, 1993). The availability of two waves of observations gives us the opportunity to investigate the dynamics of the process. Therefore, we decided to pursue an additional analysis in which we looked at lagged effects of the model (e.g. Johnson and Chang, 2000). Since the number of longitudinal investigations in this field is very limited (Williams and Podsakoff, 1989), this analysis should be regarded as strictly exploratory. In other words, we simply look for a dynamic version of the structural model of Figure 1 that fits the data in a statistical sense. In this dynamic version there are four endogenous constructs (output/input uncertainty, job satisfaction and intention to leave in the second period). Exogenous to this model are the six constructs and their lagged values, depicted in Figure 1, and the lags of output/input uncertainty, job satisfaction and intention to leave.

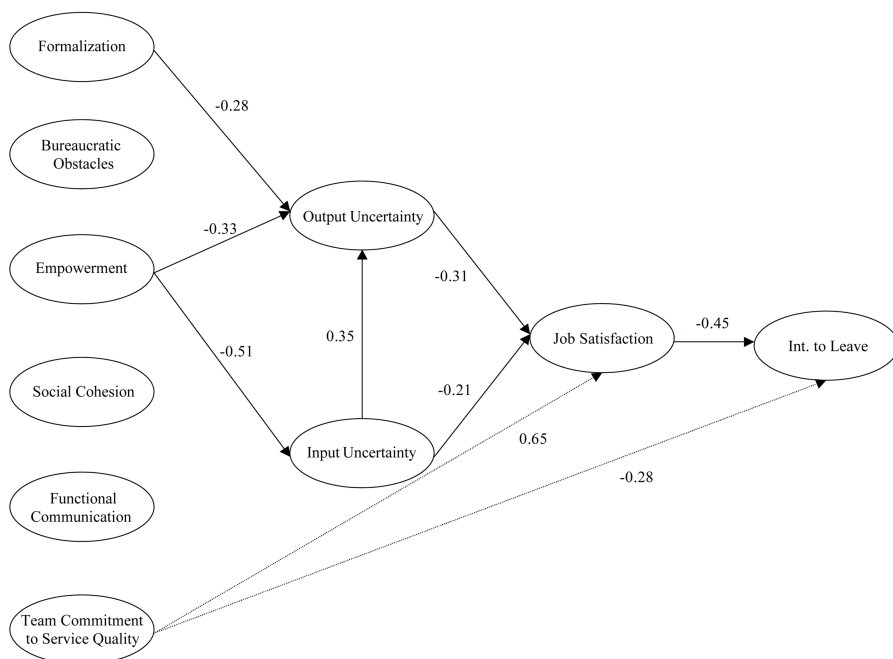


Figure 1.
Relationships in a final
cross-sectional model

Following Hom and Griffeth (1991) we first tested a sequence of nested, dynamic models. We started with the structural null model in which we assumed no substantive relationships at all. The fit of this model is clearly poor: $\chi^2(190) = 1273.11$ ($p < 0.001$); GFI = 0.38; AGFI = 0.31; TLI = 0.00; CFI = 0.00; RMSEA = 0.21. We subsequently added autoregressive effects (the lags of the endogenous constructs), contemporaneous exogenous effects and lagged exogenous effects. In each step the model improved significantly but the fit of the final model still was not adequate: $\chi^2(139) = 565.62$ ($p < 0.001$); GFI = 0.71; AGFI = 0.54; TLI = 0.43; CFI = 0.60; RMSEA = 0.15.

In a second approach, suggested by Silvia and MacCallum (1988), we initially estimated all parameters in the structural dynamic model and proceeded by fixing non-significant parameters one at a time. Based on examination of the pattern of standardized residuals and the modification indices, we arrived at the model depicted in Figure 2, from which the autoregressive relations are left out for reasons of exposition.

This model clearly shows a good fit to the data: $\chi^2(160) = 362.24$ ($p < 0.001$); GFI = 0.97; AGFI = 0.92; TLI = 0.97; CFI = 0.99; RMSEA = 0.041.

In this model all the autoregressive effects are significant, with the exception of output uncertainty and intention to leave the team. The autoregressive effects are substantial, the magnitude of the standardized coefficients ranges from 0.18 to 0.67. As far as the lagged effects are concerned, we found only one significant effect. Bureaucratic obstacles at $t=1$ has a significant influence on the output uncertainty experienced at $t=2$.

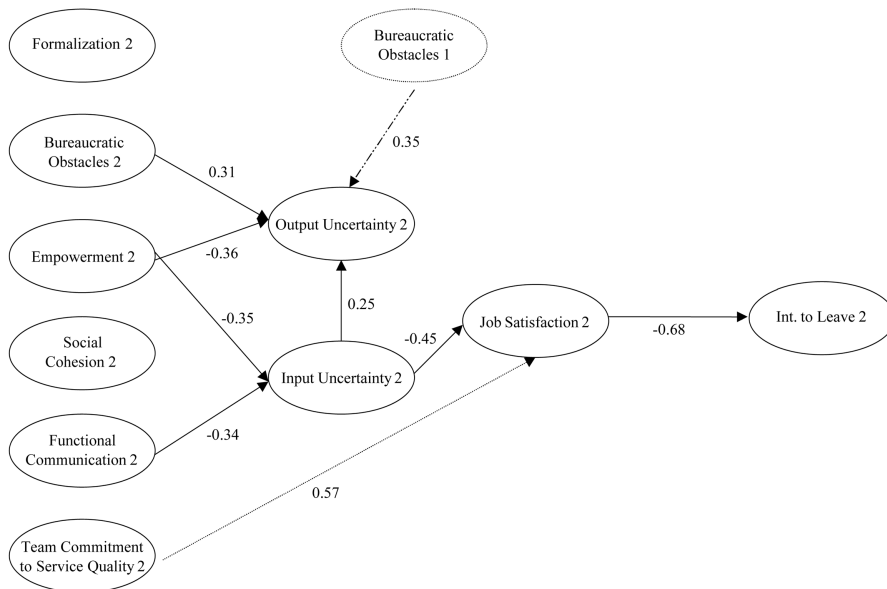


Figure 2.
Relationships in the
final longitudinal model

Discussion

The objective of this paper was to examine the antecedents and consequences of perceived uncertainty in self-managed teams. A conceptual framework was developed to test the substantive relationships using empirical data of a service company. Potential dynamic relationships within the framework were explored, using a second wave of the same cross-section. We will first discuss the results of the conceptual model and next turn our attention to the dynamic model.

Among the specified antecedents, empowerment is most strongly related to perceived uncertainty. Empowerment negatively affects both input uncertainty and output uncertainty. Highly empowered teams are characterized by employees who are clearly interested in matching the right person to the right position, knowing exactly what the position in the team requires (Wellins *et al.*, 1991). Furthermore, these findings are supported by a great amount of research that reports similar negative relationships between empowerment and uncertainty experiences of employees (Bowen and Lawler, 1992; Hartline and Ferrell, 1993, 1996).

Our cross-sectional model displays a negative effect of formalization on output uncertainty, supporting our hypothesis that the existence of clear written rules may enhance clearness of the position team members are in. Nevertheless, the occurrence of many rules may also constrain the flexibility of employees in boundary role positions (Michaels *et al.*, 1987, 1988).

The analysis revealed team commitment to service quality influences the consequences of perceived uncertainty directly. Two additional links were found:

- (1) a positive link between team commitment to service quality and job satisfaction; and
- (2) a negative link between team commitment to service quality and intention to leave.

The hypothesized negative impact on output uncertainty was not found. This latter hypothesis was developed referring to Peccei and Rosenthal (1997) who conclude that team commitment to service quality should be considered a performance-defining construct. This may interfere with another antecedent, formalization, explaining the non-significance of the team commitment to service quality construct for output uncertainty. The links between team commitment to service quality and job satisfaction and intention to leave suggest that team commitment to service quality is a critical factor to handle the consequences of perceived uncertainty. First, Peccei and Rosenthal (1997) have demonstrated that commitment to customer service is largely based upon affective action. This implies that the intrinsic motivation of team members is a major reason to serve customers in order to get personal satisfaction from giving high service quality. Second, individuals who are strongly committed to the team are expected to identify more fully with the team and its core values (Mathieu and Zajac, 1990; Peccei and Rosenthal, 1997). This is in line with

research of the similar concept of attitudinal (affective) organizational commitment. As a result, it is unlikely to expect that team members want to leave the team or the organization.

In general, it is supported that uncertainty employees perceive exerts a negative influence on job satisfaction (Brown and Peterson, 1993; Katz and Kahn, 1978). The results of the cross-sectional approach showed a negative effect of both uncertainty constructs on job satisfaction.

In the cross-sectional model no relationship was found between bureaucratic obstacles, social cohesion and functional communication and both uncertainty constructs. Perhaps, bureaucratic obstacles become apparent only after hands-on experience with self-management performance criteria is gained, an idea supported by the results of the dynamic model (see below). Adapting bureaucratic procedures to changing conditions is often a slow-motion process. The absence of any influence of social cohesion is surprising. Kolb and Aiello (1993) found that cohesiveness of teams has a positive impact on productivity, but Hyatt and Ruddy (1997) reported that team-context variables might be more important to improve team effectiveness than ensuring team members are "cohesive". Neck and Manz (1994) even argue that highly cohesive teams may engender detrimental results, because the norms they develop may be in conflict with organizational goals and are difficult to change.

With respect to functional communication, the cross-sectional model indicated no effect of functional communication on input uncertainty. Effective communication among team members about functional issues is supposed to establish confidence inside the team and to create clarity about the team goals and the responsibilities of the individual members and so reducing input uncertainty (Larsson and Bowen, 1989; Rathnam *et al.*, 1995). Our analyses show, however, that in a contemporaneous context this is not found. A potential reason might again be that it takes a little longer for confidence and clarity to be created, and so it cannot be measured immediately. The dynamic model partially supports this idea.

In summary, the proposed cross-sectional model of perceived uncertainty proved a modest basis for explaining variations in levels of both uncertainty constructs with the help of the specified variables.

Exploring the dynamic relationships shows that (contemporaneous) empowerment remains important in explaining uncertainty. Functional communication and bureaucratic obstacles start being influential in this second period. Also lagged bureaucratic obstacles are relevant now, for which there is no obvious explanation. Formalization is no longer influential, perhaps because in this second period the prescribed rules have become clear and established. The impact of team commitment to service quality on intention to leave fades out, whereas its impact on job satisfaction stands firm. Finally, the relationships between the endogenous constructs are all confirmed in the second period with the exception of output uncertainty on job satisfaction. It must be acknowledged, however, that the interpretation of

all these relationships is somewhat obscured by the presence of autoregressive effects.

From this exercise we basically infer two things. First, true dynamic effects, i.e. effect of construct X in period t-1 on construct Y in period t, are almost absent. This may be explained by the relatively long time period between the two waves. Alternatively, the reason may be that the conceptual framework is inherently static. All previous research on which our model is based is static in nature, hence no attention is given to possible lagged, dynamic effects.

Second, dynamics of another kind were found. Different antecedents affect perceived uncertainty in both periods. This is an important observation, as it implies that both theoretical and managerial emphasis has to depend on the development stage in which the self-managed teams are observed.

Theoretical implications

Several limitations of our research project have to be recognized. First, our focus on a single service industry may raise concerns about limited external validity. Constraining the study to a single industry eliminates problems associated with the effects of industry differences (cf. Hartline and Ferrell, 1996), but future research will have to reveal whether the results are generalizable to other settings.

Second, the data collection was restricted to one data source. Only self-report questionnaires administered to members from self-managed teams were used as measurement instruments. Consequently, the strength of the relationships between the constructs may be somewhat inflated by common method variance. However, we extensively pre-tested and cross-validated our measures and method variance and considering the results of the construct validation, it is unlikely that the results of our model are solely due to common method variance. Furthermore, we tried to minimize the biased responses to our measurement instruments by:

- ascertaining the confidentiality of the respondents;
- immediately sending the questionnaires to the researchers.

Nevertheless, the use of more than one data source is recommended in future research. Team performance can also be assessed with other kinds of data such as objective performance measures and manager evaluations of work groups. Furthermore, the use of customer ratings as team performance instrument is strongly recommended. Though some literature has investigated the link between employee attitudes and customer satisfaction (Johnson, 1996; Schmit and Allscheid, 1995), the link between self-managed team data and customer perceptions of service quality has remained largely unaddressed (Hyatt and Ruddy, 1997; Janz *et al.*, 1997).

Regarding the specification of the model we found that contextual factors, rather than intra-team processes, have an important impact on perceived

uncertainty. However, with respect to team functioning in terms of job satisfaction and intention to leave the team, both the team itself as well as the environment in which the team operates are of crucial interest.

Another and more general point concerns the investigated team characteristics in general management literature. As previously noted, the bulk of the literature about self-managed work-team has focussed on merely positively worded team characteristics. Although authors have already addressed the negative symptoms of group-think (e.g., Janis, 1988; Neck and Manz, 1994), only little research has been done on other negative team aspects yet (cf. Rathnam *et al.*, 1995; Terra, 1995). Hence, it may be fruitful to investigate other negative team aspects. Furthermore, it has been demonstrated that personality and biographic characteristics are also related to group processes and outcomes (Barrick *et al.*, 1998; Kichuk and Wiesner, 1997). It is recommended that the model be extended with these kinds of variables.

Our research showed quite unexpectedly that team commitment to service quality serves as a critical factor in dealing with the negative consequences of perceived uncertainty. However, it remains unclear what aspects determine team commitment to service quality. Furthermore, the direct relationship between team commitment to service quality and other team performance aspects is still unexplored. Future research needs to address the underlying aspects of team commitment to service quality as well as how team commitment to service quality is related to team effectiveness in service companies.

In our study we applied only one-dimensional constructs. For some of the constructs multi-dimensionality has been suggested. First, empowerment may be decomposed into (1) competence and (2) autonomy (Chiles and Zorn, 1995). Team members must both feel capable of effectively performing their job and believe that they have the authority to make the necessary decisions with respect to their job. Second, job satisfaction may contain both an intrinsic and an extrinsic element (cf. Ironson *et al.*, 1989). Finally, team commitment to service quality may be decomposed into several aspects by analogy to similar commitment measures such as organizational commitment and commitment to customer service:

- affective commitment;
- calculative commitment; and, sometimes,
- normative commitment (Peccei and Rosenthal, 1997).

In summary, additional research should further investigate the various aspects of the constructs mentioned here.

The data of our study were collected and analyzed at the same, individual, level as is usually recommended (Schneider, 1983). Besides this, given the small number of teams included in our study, aggregated data would provide unreliable estimates. Nevertheless, it must be emphasized that some of the

measured items refer to aggregate processes (Mathieu, 1991). So, the data measure the perception of the individual respondents concerning the team level constructs. Measuring and analyzing these constructs on team level may further improve our understanding of the underlying processes (George and Bettenhausen, 1990).

The results showed that the lagged effects are less important compared to the contemporaneous effects. The absence of lagged effects may be caused by the length of the time period between the measurements. Future research needs to include more waves and shorter lags. The contemporaneous effects in our model may reflect the effects of shorter lags (Williams and Podsakoff, 1989).

The change in specification of the model supports the idea that the relationships are not static, but changing. Further research into these changing patterns is necessary to a better understanding of these changes and to turn from the present exploratory approach to a confirmatory analysis.

Managerial implications

It has been demonstrated that perceived uncertainty significantly affects self-managed team outcomes in terms of job satisfaction and intention to leave the team. Therefore, it is of fundamental interest to reduce perceived uncertainty of service employees.

Empowerment may be an effective tool to reduce both input and output uncertainty. It needs further investigations to assess how the identified empowerment aspects (competence and autonomy) are related to both uncertainty constructs. The hypothesized effects of formalization, bureaucratic obstacles and functional communication on perceived uncertainty are partly confirmed by our results, in particular in later stages of working with self-managed work teams only. As discussed earlier, no effects of social cohesion and team commitment to service quality on perceived uncertainty were found. Hence, additional research is recommendable to get a more accurate and unambiguous picture how the various specified antecedents are related to perceived uncertainty.

Team commitment to service quality appears to be a major determinant of perceived uncertainty consequences in terms of job satisfaction and intention to leave the team and thus, a major determinant of service team effectiveness. It has been demonstrated that job satisfaction of employees is positively related to customer's perceived service quality (Hartline and Ferrell, 1996). Also, regarding employee turnover, Wetzels (1998) emphasized the importance of continuity in service industries as a prerequisite for high service quality.

In general, management in service companies should maintain the empowerment ingredient in their team approach and adapt their human resource policies to increase commitment to customer service at team level.

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Appendix. Sample items for each construct used

Perceived
uncertainty in
service teams

Construct	Sample item
Formalization	Clear and planned goals and objectives are set for service team performance by upper management
Bureaucratic obstacles	Suggestions for service improvement proposed by my team take a long time
Empowerment	Our team is allowed a high degree of initiative
Social cohesion	Team members consistently help each other on the job
Functional communication	It is relatively easy to keep for team members to keep each other informed about work
Team commitment to service quality	Our team is always working to improve the quality of service provided to customers
Output uncertainty	It is often not clear which criteria will be used for evaluating our team performance
Input uncertainty	It is often not clear what the total volume of service problems on a daily basis will be
Job satisfaction	I am satisfied with the support provided by the organization
Intention to leave	If circumstances permitted I would jump at the chance to accept a job with another firm